F-35 Joint Strike Fighter (JSF)

The F-35 Joint Strike Fighter (JSF) intends to develop a family of strike aircraft to meet an advanced threat (year 2010 and beyond), while maintaining a focus on affordability. This family of strike aircraft will consist of three variants: Conventional Takeoff and Landing; Aircraft Carrier Suitable; and Short Takeoff and Vertical Landing (STOVL). The System Development and Demonstration (SDD) phase will develop, acquire, and test the F-35 weapon system in a series of block upgrades. To accommodate the phased integration of capabilities and functionality, interim blocks will be tested by the Integrated Test Force and the Operational Test Agencies, and may be deployed by the Services for limited use. The first three blocks are intended to deliver an aircraft that is Joint Operational Requirements Document threshold-compliant. As SDD progresses, the users are expected to develop requirements for additional capabilities for future block upgrades to respond to new threats and to leverage emerging technology to address those new threats or to further improve the reliability and maintainability of the aircraft.

Approximately biennial Operational Assessments will determine potential operational effectiveness and suitability with a focus on programmatic voids, areas of risk, testability of requirements, significant trends in development efforts, and the ultimate ability of the program to support an adequate period of evaluation during the dedicated Operational Test. Operational Assessments will not substitute for the independent period of dedicated Operational Test necessary to support decisions on full-rate production.

The F-35 qualifies as a covered program requiring both lethality and vulnerability Live Fire Test and Evaluation (LFT&E). The JSF Program will conduct full-up, system-level (FUSL) Live Fire Testing of the STOVL variant using one of the flight test aircraft from the SDD phase that has reached the end of its operational flight lifetime.

TEST & EVALUATION ACTIVITY

DOT&E has continuously participated in JSF Operational Test and Evaluation (OT&E) and LFT&E planning activities since June 1995. Integrated Product Team meetings have been held to coordinate the integrated program of Developmental Test and Evaluation, OT&E, and LFT&E planned during SDD phase. The Combined Test Working Group provides a single forum for the member services, OSD, and the weapon systems contractors for all Test and Evaluation related matters.

The Test and Evaluation Master Plan (TEMP) was updated on September 19, 2002, and is being reviewed by the Services. The revised TEMP reflects the additional fidelity of requirements and resources now available following the selection of Lockheed Martin Aeronautics Company as the SDD contractor.

Live fire testing continued this year with additional component-level testing of the fuel tanks and canopy. The first test series of a multi-phase, hydrodynamic ram damage mitigation test program has been completed and the results are currently being analyzed to identify promising design configurations. Development of a successful damage mitigation technique for the fuel tanks is essential to achieving the desired vulnerability objectives.

Joint Strike Fighter Family of Aircraft

TEST & EVALUATION ASSESSMENT

The F-35 program enjoys support from three services and a financial investment from more than a dozen foreign governments. As a result of this broad support, the JSF engineering development team and test activities are well staffed and have established open lines of communications. Both of these factors increase the likelihood that the transition from Developmental Testing to Operational Testing to individual Service introduction will be more efficient and that the variants of the aircraft delivered to the Services will be effective and suitable. The challenge to the Joint Program Office will be to maintain focus on quality staffing and open discussions throughout the SDD effort.

The JSF is expected to have significantly improved interoperability and information warfare capabilities, as well as a very highly evolved set of sensors, all of which will be integrated with the avionics systems. These systems will provide the F-35 with some of its most distinctive and important operational capabilities. Adequately testing these advanced capabilities at an operational mission level will be a challenge to the test program.

The JSF will employ some new technologies and these must be identified early in the program so that they can be monitored during the test program. As one example, the method of providing vertical thrust to the STOVL variant represents a significant advance over current operational systems and thus carries a corresponding risk, and special attention should be given to this sub-system. Another area that should be given extra attention is the performance and maintenance requirements of the Low Observables (LOs) and other classified capabilities on the JSF, particularly in the shipboard environment. Current LO systems have experienced difficulties after being fielded, and the JSF test program should endeavor to identify these potential problems during early testing so that any required corrections can be completed prior to fielding the system.

The current planning for dedicated OT&E includes 14 Low-Rate Initial Production flight test aircraft in block two plus several ground test articles. While this large number of aircraft is adequate for the conduct of a thorough operational test, it is not excessive since three different aircraft configurations must be tested in the accomplishment of a variety of missions. In block three, six additional jets, two of each variant, will be added to allow for additional operational test requirements.